

as percentages by mass. Support for these amendments can be found at least at page 4, lines 1-3 and page 38, lines 12-15 of the specification, respectively. Also, claim 61 has been amended to further define the coating as a coating which --is produced by-- the process of claim 60. Additionally, new claims 62-65 have been added to further define preferred embodiments of the invention. Numerous additional claim amendments have been made to place the claims in a format that is more consistent with U.S. patent practice.

Turning now to the Official Action, claims 5, 13, 28-29, 58-59 and 61 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite. Applicants have amended claims 5, 13, 28-29, 58-59 and 61 to obviate this rejection. More specifically, with respect to claim 5, Applicants have deleted the words "with the exclusion of lactams." Additionally, Applicants have added new claim 62 to further define the process of claim 5 so that when the blocking agent is a lactam, the pKa can be greater than 14. Support for new claim 62 can be found at least at page 9, lines 14-27 of the specification. Claim 13 has been amended by deleting the word "grinding" before the word "mixer." Claim 28 has been amended by further defining X and X' as a divalent radical. Additionally, claim 28 has been amended by deleting the word "substituted" before the word "aryls." Additionally, new claim 63 and corresponding claims 64-65 have been added to further define R1 and R2 as a hydrocarbon radical comprising aryls or alkyls substituted with a halogen atom. Support for new claims 63-65 can be found at least at page 18, lines 3-6. Claim 29 has been amended to further define the method as comprising using an effective amount of a surfactant --to form an emulsion--. Claim 29 has been amended in this manner to clarify what the amount of surfactant is effective in doing. Support for this amendment

can be found at page 11, lines 20-22. Claims 58-59 have been amended to further define the disclosed percentages as percentages by mass. Support for the amendments to claims 58 and 59 can be found at least at page 4, lines 1-3 and 38, lines 12-15, respectively. Additionally, claim 61 has been amended to define the coating as being produced by the process of claim 60.

For at least these reasons, reconsideration and withdrawal of the rejection are respectfully requested.

Claim 28 stands rejected under 35 U.S.C. §112, first paragraph, as failing to be properly enabled by the specification. Applicants have amended claim 28 to obviate this rejection. More specifically, as explained above, Applicants have amended claim 28 by deleting the word "substituted" before the words "aryls or alkyls." Additionally, Applicants' have added new claim 63 and claims 64-65 to further define the aryls or alkyls as being aryls or alkyls substituted with a halogen atom. Support for new claims 63-65 can be found at least at page 18, lines 3-6.

Claims 1-15, 21-41 and 46-61 stand rejected under 35 U.S.C. §102(b) as being anticipated by *Nachtkamp et al.* (U.S. Patent No. 4,303,774). For at least the reasons that follow, withdrawal of the rejection is in order.

The present invention relates a process for the emulsion synthesis of block (poly) isocyanates, to the emulsions thus obtained, to their use in order to make compositions which are useful for coating surfaces and to the coatings thus obtained. See specification at page 1, lines 4-7.

For example, independent claim 1, as amended above, sets forth a process for preparing an emulsion of block (poly)isocyanates. The process includes contacting an isocyanate composition containing free isocyanate functions with at least one blocking agent A in the presence of a surfactant B and an aqueous phase. The isocyanate composition being added gradually to at least a portion of the aqueous phase and at least a portion of the blocking agent.

Nachtkamp et al. relates to water soluble or water dispersible polyurethane elastomers which have a substantially linear molecular structure and which contain both ethylene oxide units incorporated in polyether chains and sulphonate groups, characterized in that they contain from about 0.5 to 20% by weight of ethylene oxide units of the formula $-CH_2-CH_2-O-$. The ethylene oxide units being arranged within polyether chains and from about 0.1 to 25 milli equivalents, per 100 g of solid, of sulphonate groups of the formula $-SO_3^-$ in the form of structural units of the formula $-O-X-R$. See *Nachtkamp et al.* at column 2, lines 13-25.

Nachtkamp et al. does not disclose or suggest each feature of the presently claimed invention. For example, *Nachtkamp et al.* does not disclose or fairly suggest a method for preparing an emulsion of block (poly)isocyanate or a method for blocking isocyanate, as set forth, for example, in independent claims 1 and 29. Nor does *Nachtkamp et al.* disclose or fairly suggest an isocyanate composition comprising both a blocking agent and a surface-acting agent as disclosed, for example, in independent claim 46.

In particular, *Nachtkamp et al.* discloses a process for the formation of polyurethane elastomers, especially for the preparation of polyurethane, which are water soluble or

hydro-dispersible. See the claims of *Nachtkamp et al.* Nowhere does *Nachtkamp et al.* disclose or fairly suggest any block (poly)isocyanate or any method for preparing an emulsion of blocked (poly)isocyanate, as claimed.

For instance, the Examples of *Nachtkamp et al.* disclose first forming a prepolymer, and then adding an imine and then admixing the resulting mixture to a mixture of water and hydrazine hydrate. Accordingly, Applicants submit that *Nachtkamp et al.* fails to disclose or fairly suggest the composition of the presently claimed invention comprising both a blocking agent and a surface-active agent, or the claimed processes for preparing such a composition.

For at least these reasons, the presently claimed invention is not anticipated by *Nachtkamp et al.* Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

Claims 1-41 and 46-61 stand rejected under 35 U.S.C. §102(b) as being anticipated by *Tirpak et al.* (U.S. Patent No. 5,300,556). For at least the reasons that follow, withdrawal of the rejection is in order.

Tirpak et al. relates to an improved process for the preparation of aqueous dispersions containing both blocked polyisocyanates and polyhydroxyl compounds. See *Tirpak et al.* at column 1, lines 11-15.

Tirpak et al. does not disclose or suggest each feature of the presently claimed invention. For example, *Tirpak et al.*, like *Nachtkamp et al.*, fails to disclose or suggest a process for preparing an emulsion of block (poly)isocyanates, a composition prepared by

such a process, a method of coating using such an emulsion or a coating prepared by such a process as set forth, for example, in claims 1, 29, 46, 60 and 61.

In particular, *Tirpak et al.* discloses preparing an aqueous dispersion containing a blocked (poly)isocyanate together with a polyhydroxylated compound. Nowhere, does *Tirpak et al.* disclose or fairly suggest any emulsion of blocked (poly)isocyanate or a process for preparing such blocked (poly)isocyanate.

For at least these reasons, the presently claimed invention is not anticipated by *Tirpak et al.* Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

Claims 1-41 and 46-61 stand rejected under 35 U.S.C. §102(b) as being anticipated by *Rimmer* (WO 97/12924). For at least all the reasons that follow, withdrawal of the rejection is in order.

Rimmer relates to water dispersible blocked polyisocyanates, methods for making them, water-based storage material and coatings containing them. See *Rimmer* at page 1, lines 1-5.

Rimmer does not disclose or fairly suggest each feature of the presently claimed invention. For example, *Rimmer* does not disclose or fairly suggest a process for preparing an emulsion of blocked (poly)isocyanates, a composition prepared by such a process, a method for producing a coating from such composition or a coating produced by a coating process as disclosed, for example, in claims 1, 29, 46, 60 and 61.

In particular, as explained at length above, the presently claimed invention relates to a process for preparing an emulsion of blocked (poly)isocyanates, wherein a blocking agent

and a surface-active agent are mixed together with an isocyanate compound. This one-step reaction of blocking and emulsifying is neither disclosed nor suggested by *Rimmer*.

Furthermore, nowhere does *Rimmer* disclose or fairly suggest a method for blocking isocyanate functions on an aromatic compound while allowing aqueous emulsification of the compound obtained by using an effective amount of a surfactant to form an emulsion, wherein the surfactant comprises a compound comprising an anionic function and optionally a polyethylene glycol and/or polypropylene glycol chain fragment of at least one oxyethylene and/or oxypropylene units.

For at least these reasons, the presently claimed invention is not anticipated by *Rimmer*. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

Claims 1-61 stand rejected under 35 U.S.C. 103(a) as being unpatentable over each of *Nachtkamp et al.*, *Tirpak et al.* and *Rimmer*, each further in view of *Yasuda* (EP 367667). For at least the reasons that follow, withdrawal of the rejection is in order.

For at least all the reasons discussed above, the presently claimed invention is neither disclosed nor suggested by any of *Nachtkamp et al.*, *Tirpak et al.* and *Rimmer*.

Yasuda fails to overcome the above-identified deficiencies of *Nachtkamp et al.*, *Tirpak et al.* and *Rimmer*.

Yasuda relates to a new polyurethane resin containing at least one phosphoric acid group and its use in a magnetic coating formulation and a magnetic recording medium. The magnetic recording media can include, for example, magnetic tapes, magnetic disks, magnetic cards and the like. See *Yasuda* at page 2, lines 1-3.

Yasuda does not disclose or fairly suggest each feature of the presently claimed invention. That is, nowhere does *Yasuda* disclose or fairly suggest a process for preparing an emulsion of blocked (poly)isocyanates wherein a blocking agent and a surface-active agent are mixed together with an isocyanate compound.

In particular, while the present invention is directed to a one-step reaction of blocking and emulsifying, the composition obtained therefrom, processes for producing coatings from such compositions and coatings comprising such compositions, nowhere does *Yasuda* disclose or fairly suggest performing such a one-step reaction. Instead, *Yasuda* is substantially directed to a phosphorous compound.

Additionally, while the structure of the surface-active phosphorous compound of *Yasuda* may be similar to the surface-active compound used in the presently claimed invention, nowhere does *Yasuda* disclose or suggest that the surface-active compound should or even could be used in a one-step reaction wherein blocking and emulsification are achieved to prepare an emulsion of block (poly)isocyanates, as claimed. That is, *Yasuda* only deals with a polyurethane resin containing a phosphorous compound that is used as a magnetic coating composition.

Accordingly, absent any disclosure or suggestion in any of the primary references or in *Yasuda*, Applicants submit that no person of ordinary skill in the art would have been motivated to use the disclosed surface-active agent to modify the processes of the primary references to arrive at the presently claimed invention. In particular, Applicants submit that because *Yasuda* is substantially directed to phosphorous compounds used as magnetic coatings which are in no way related to processes for obtaining emulsion block

(poly)isocyanates, Applicants submit that it is not even remotely possible that one of ordinary skill in the art would have been motivated by *Yasuda* to modify the processes of the primary references with the disclosed phosphorous compounds to arrive at the presently claimed invention.

For at least these reasons, the presently claimed invention would not have been obvious over *Nachtkamp et al.*, *Tirpak et al.* or *Rimmer*, either alone or in combination with *Yasuda*. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

Claims 42-45 stand rejected under 35 U.S.C. §102(b) as being anticipated by *Anand* (U.S. Patent No. 5,037,864) and *Markusch* (U.S. Patent No. 4,879,322). For at least the reasons that follow, withdrawal of the rejection is in order.

The Official Action alleges that the figures in each of the above patents disclose each and every limitation of the invention of claims 42-45. Applicants respectfully disagree. For example, the plant defined in claims 42-45 is defined as comprising means for recirculating the aqueous phase in the form of a masked polyisocyanate emulsion. In addition, dependent claim 45 further defines the recirculation means as comprising a recirculation loop. In stark contrast, nowhere in the figures of *Anand* or *Markusch* is there a plant that includes a recirculating loop as set forth in claims 42-45.


For at least these reasons, the presently claimed invention is not anticipated by *Anand* or *Markusch*. Accordingly, reconsideration and withdrawal of the rejection are respectfully requested.

From the foregoing, further and favorable action in the form of a Notice of Allowance is believed to be next in order, and such action is earnestly solicited.

If there are any questions concerning this paper or the application in general, the Examiner is invited to telephone the undersigned at the Examiner's earliest convenience.

Respectfully submitted,

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1. (Twice Amended) Process for [the preparation of] preparing an emulsion of blocked (poly)isocyanates, said process comprising:

a) [placing] forming a mixture by contacting an isocyanate composition containing free isocyanate functions [in contact] with at least one blocking agent A in the presence of a surfactant B and an aqueous phase, said isocyanate composition being added gradually to at least [some] a portion of the aqueous phase and at least [some] a portion of the blocking agent.

5. (Twice Amended) Process according to Claim 1, wherein said blocking agent contains at least one labile hydrogen and [in that the] wherein a pKa of [the] reactive hydrogens is at least equal to 4 [and in that said pKa] but is not [more] greater than 14 [, with the exclusion of lactams].

10. (Twice Amended) Process according to Claim 1, wherein [the placing in contact] said contacting is carried out [with] by stirring [using] with a mixer [device] under conditions [which] that ensure that 90% by mass of [the] particles in the emulsion are between 0.005 and 50 [micrometres] micrometers in size.

13. (Twice Amended) Process according to Claim 1, [wherein] further comprising recirculating the [reaction] mixture [is subjected to recirculation], and

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subjecting the mixture [during which it is subjected] to [the] grinding action of a [grinding] mixer during recirculation.

14. (Twice Amended) Process according to Claim 1, wherein said [placing in contact] contacting is carried out by [addition of] adding reagent(s) to at least one aqueous phase and at least [some] a portion of the blocking agent(s).

15. (Twice Amended) Process according to Claim 1, wherein said [placing in contact] contacting is carried out by [addition of] adding reagent(s) to a medium containing at least one aqueous phase, at least [some] a portion of the surfactant(s) and at least [some] a portion of the blocking agent(s).

16. (Twice Amended) Process according to Claim 1, [said processing also] further comprising:

b) subjecting the mixture obtained in step a) to a shear (speed gradient) of greater than $1000s^{-1}$; and

c) repeating step b), optionally after step a) has been repeated, until a stable emulsion is obtained whose particles have a Sauter diameter of greater than $0.1\ \mu m$ and a dispersion width of less than $5\ \mu m$.

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17. (Twice Amended) Process according to Claim 16, wherein step c) is continued after [the end of the addition of] adding the isocyanate composition.

19. (Twice Amended) Process according to claim 16, wherein the [reaction] mixture is [subjected to recirculation] recirculated in a colloidal mill.

20. (Twice Amended) Process according to Claim 19, wherein the aqueous phase, to which [the] said isocyanate composition optionally containing the surfactant and/or a solvent is added, is subjected to a first shear (speed gradient) of less than $20,000\text{s}^{-1}$, after [placing in contact] contacting said composition with the blocking agent and before [the high-shear] step b).

24. (Twice Amended) Process according to Claim 1, wherein said surfactant is an anionic surfactant containing at least one function [chosen from] selected from the group consisting of aryl and/or alkyl sulphates or phosphates, aryl or alkyl phosphonate, phosphinate and sulphonate.

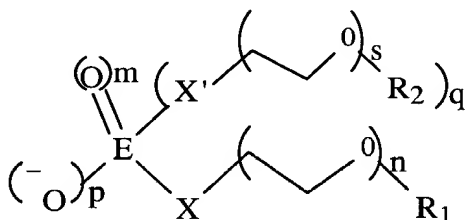
26. (Twice Amended) Process according to Claim [1] 25, wherein said compound contains a hydrophilic part formed of said anionic function, said polyethylene

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glycol and/or polypropylene glycol chain fragment, and a lipophilic part based on a hydrocarbon-based radical.

27. (Twice Amended) Process according to Claim [1] 26, wherein said lipophilic part comprises alkyl or aryl groups.

28. (Twice Amended) Process according to Claim 1, wherein the surfactant is an anionic surfactant [, the] comprising an anionic [part] function corresponding to the following formula:



where q represents zero or 1;

where p represents an integer between 1 and 2, including the limits;

where m represents zero or an integer between 1 and 2, including the limits;

where X and X', which may be similar or different, represent [an arm] a divalent radical containing not more than two carbon-based chain members;

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where s is zero or an integer [chosen] between 1 and 30, including the limits;

where n is zero or an integer [chosen] between 1 and 30, including the limits;

where E is an element [chosen from] selected from the group consisting of carbon,
and [the] metalloid elements of atomic rank at least equal to that of phosphorus and
belonging to column VB or to [the] chalcogens of atomic rank at least equal to that of
sulphur;

where R₁ and R₂, which may be similar or different, represent a hydrocarbon-based
radical comprising [substituted] aryls or alkyls.

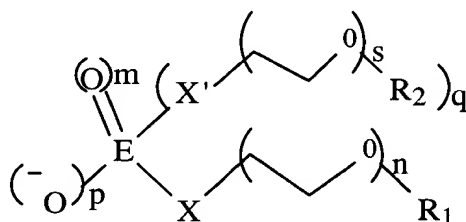
29. (Twice Amended) A method for blocking isocyanate functions on an
aromatic compound while allowing aqueous emulsification of the compound obtained,
comprising using an effective amount of a surfactant [comprises] to form an emulsion, the
surfactant comprising a compound comprising an anionic function and optionally a
polyethylene glycol and/or polypropylene glycol chain fragment of at least one oxyethylene
and/or oxypropylene units.

30. (Twice Amended) The method according to Claim 29, [comprising a]
wherein the compound comprises [containing an anionic function and] a polyethylene glycol
and/or polypropylene glycol chain fragment of at least 5 oxyethylene units.

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32. (Twice Amended) The method according to Claim [29] 31, wherein [the] said lipophilic part comprises alkyl or aryl groups.

33. (Twice Amended) The method according to Claim 29, wherein the anionic [part] function of the [surface active] compound corresponds to formula I below:



where q represents zero or 1;

where p represents an integer between 1 and 2, including the limits;

where m represents zero or an integer between 1 and 2, including the limits;

where X and X', which may be similar or different, represent [an arm] a divalent radical containing not more than two carbon-based chain members;

where s is zero or an integer chosen between 1 and 30, including the limits;

where n is zero or an integer chosen between 1 and 30, including the limits;

where E is an element [chosen from] selected from the group consisting of carbon,
[and the] and metalloid elements of atomic rank at least equal to that of phosphorus and

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belonging to column VB or to [the] chalcogens of atomic rank at least equal to that of sulphur;

where R₁ and R₂, which may be similar or different, represent a hydrocarbon-based radical comprising [optionally substituted] aryls or alkyls.

34. (Twice Amended) The method according to Claim 29, wherein [the] a counter-cation of the surfactant is an amine.

35. (Twice Amended) The method according to Claim 29, wherein said composition [containing] comprises an isocyanate function [contains] containing, on average, 1 to 5 isocyanate functions per molecule bearing isocyanate function(s).

36. (Twice Amended) The method according to Claim 29, wherein said composition [containing] comprises an isocyanate function [contains] containing, on average, 4/3 to 4 isocyanate functions per molecule bearing isocyanate function(s).

37. (Twice Amended) The method according to Claim 29, wherein [said] a blocking agent is present that contains at least one labile hydrogen.

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38. (Twice Amended) The method according to Claim 29, wherein [said] a blocking agent is present that contains at least one labile hydrogen and in that [the] a pKa of [the] reactive hydrogens is at least equal to 2 but is not greater than 11.

39. (Twice Amended) The method according to Claim 29, wherein [the] a pH of [the] an aqueous phase is maintained at a value of not more than 12, throughout the reaction.

40. (Twice Amended) The method according to Claim 29, wherein [the] a pH of [the] an aqueous phase is maintained at a value at least equal to the value (pKa-2) of [the] a blocking agent, or of one of [the] multiple blocking agents, throughout the reaction.

41. (Twice Amended) The method according to Claim 29, wherein [the] a mass ratio between the surfactant and [the] isocyanates is less than 20% and greater than 2%.

42. (Twice Amended) Plant for carrying out the process according to Claim 16, which comprises at least:

- a shear means which can generate a shear rate (speed gradient) of greater than 1000 s^{-1} ; [and]

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- means for injecting an isocyanate composition into an aqueous phase; and
optionally one or more of the following means:
 - means for recirculating the aqueous phase in the form of a masked polyisocyanate emulsion;
 - means for regulating [the] injection flow rate of the isocyanate composition into the aqueous phase;
 - means for homogenizing the emulsion;
 - means for cooling the system; and
 - means for removing the aqueous blocked polyisocyanate emulsion.

44. (Twice Amended) Plant according to Claim 42, wherein the means for injecting the polyisocyanate composition comprises:

- a vat for premixing the polyisocyanate with all or some of the surfactant and/or the solvent; and
- an inlet pipe for the polyisocyanate composition in contact with [the] a blocking agent.

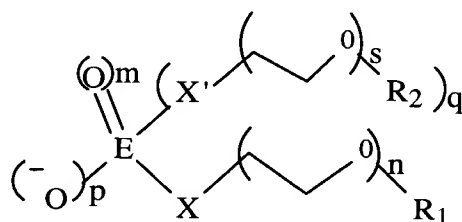
45. (Twice Amended) Plant according to Claim 42, wherein the recirculation means [comprise] comprises a recirculation loop.

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46. (Twice Amended) Composition [containing] comprising a blocked polyisocyanate emulsion, which [contains] comprises a surfactant comprising an anionic function and a polyethylene glycol and/or polypropylene glycol chain fragment of at least 1 oxyethylene and/or oxypropylene units, said surfactant being present in free form and optionally also bound to [the] a polyisocyanate, [with the proviso that] wherein when [the] a mean diameter of [the] particles of the emulsion is less than 5 μm , and wherein said surfactant does not contain sulfate groups.

49. (Twice Amended) Composition according to claim 46, wherein said emulsion is made of particles having a Sauter diameter equal to or less than 5 μm and a dispersion width equal to or less than 5 μm .

52. (Twice Amended) Composition according to Claim 51, wherein the surfactant is of the following formula:



where q represents zero or 1;

where p represents an integer between 1 and 2, including the limits;

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where m represents zero or an integer between 1 and 2, including the limits;

where X and X', which may be similar or different, represent [an arm] a divalent radical containing not more than two carbon-based chain members;

where s is zero or an integer selected between 1 and 30, including the limits;

where n is zero or an integer selected between 1 and 30, including the limits;

where E is an element selected from the group consisting of carbon and [the] metalloid elements of atomic rank at least equal to that of phosphorus and belonging to column VB or to the chalcogens of atomic rank at least equal to that of sulphur; and

where R₁ and R₂, which may be similar or different, represent a hydrocarbon-based radical comprising [optionally substituted] aryls or alkyls.

54. (Twice Amended) Composition according to Claim 46, further comprising [which also contains] a release catalyst, which is optionally a latent catalyst.

55. (Twice Amended) Composition according to Claim 46, further comprising [which contains] at least one polyol.

56. (Twice Amended) Composition according to Claim [46] 55, wherein said polyol is a nanolatex whose d₈₀ is not more than 1 [micrometre] micrometer.